It may be thus described:—

LICHENELLA.

Coral frondose, erect, branched, hard, calcareous, and brittle; the stems and branches are convex on one side, and flat or rather concave on the other; the stem is broad and flat; the branches are narrow, with a more or less expanded thinner margin, which is dilated into broad foliaceous expansions at the tip, which are sometimes proliferous, giving out at the top a thin branch bearing an expanded tip.

The concave surface of the stem and branches are marked with the remains of squarish cells. The expanded ends of the branches are sometimes smooth on both sides; but generally they are marked externally with longitudinal grooves, and on the upper side furnished with longitudinal series of thin, rather calcareous, cells, which are each furnished with a regularly circumscribed roundish mouth closed by a thin membrane marked with a central longitudinal depression. The smooth surface of the coral under the microscope is marked with closed transverse punctated undulated cross lines.

This coral has much more the appearance of a *Lichen* than of a *Flustra*.

1. LICHENELLA BRENTII. B.M.

Hab. W. Australia (*F. Brent, Esq.*, 1850).

The coraloid is so very like the calcareous *Alga* named *Mastophora Lamourouxii* by Descaine, from the same locality, that I am in doubt if it should be regarded as distinct from it. It differs from the usual specimens of that *Alga* in the leaf-like expansions being covered with cells on the upper surface, and longitudinally grooved on the under surface, the grooves forming the ridge between the cells on the upper side, while in the *Alga* both sides of the leafy expansions are smooth like *Pavonia*; but I must at the same time own that there are one or two of the expansions at the top of one or two of the branches that are smooth like the *Alga*.

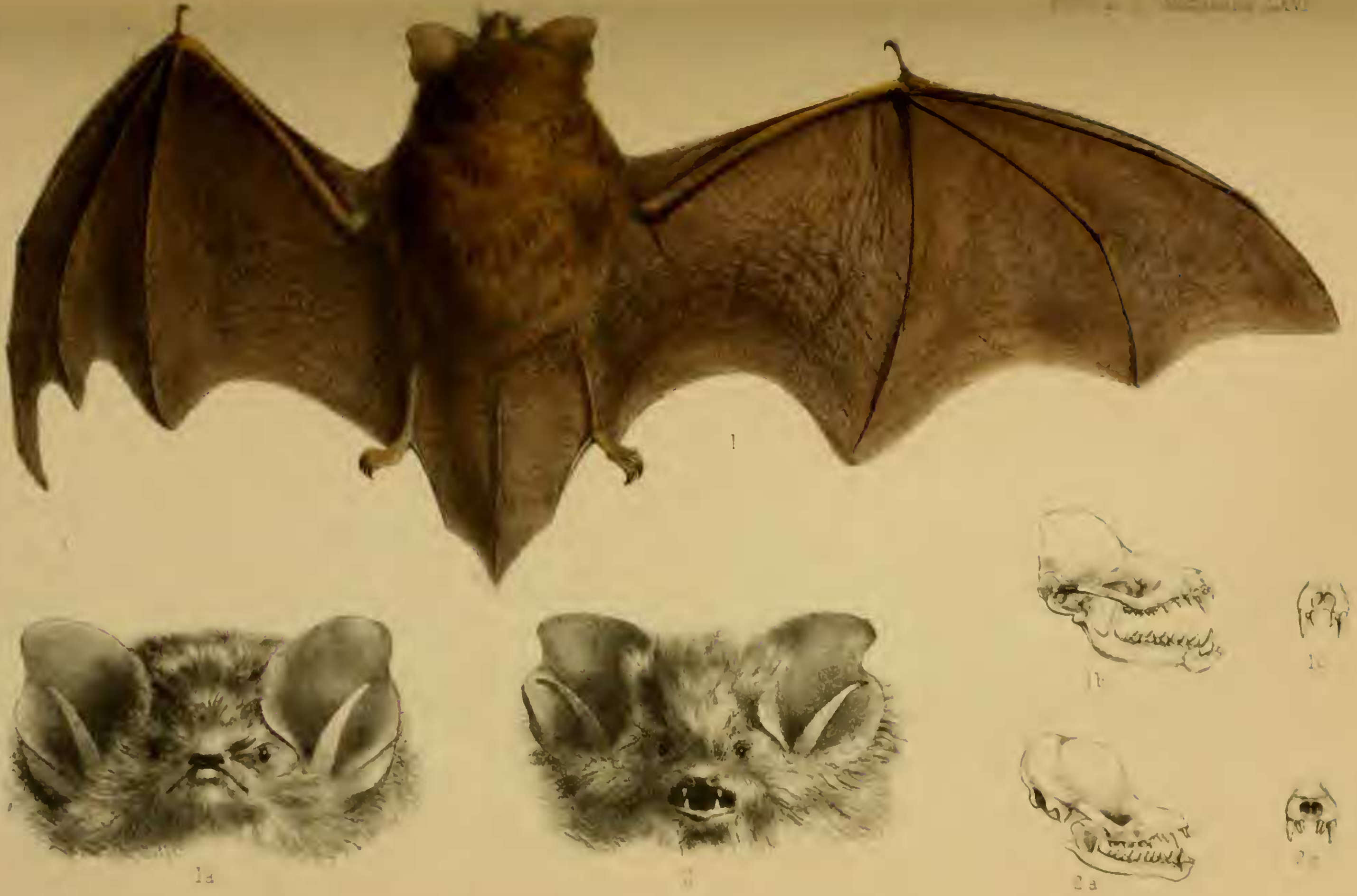
Can it be a specimen of *Mastophora Lamourouxii* in which the form of the leaves is changed by a parasitical coral, which causes the leaves to be longitudinally radiately grooved?

9. A MONOGRAPH OF THE GENUS KERIVOULA.

BY ROBERT F. TOMES.

(Mammalia, Pl. LXVI.)

The following monograph is one of a series which I have prepared, having for their object the definition of groups or genera rather than the description of the species of which they are composed. This has been done with a view to render less difficult the determination of the species, which difficulty is chiefly felt from the indiscriminate manner in which they are thrown together by some zoologists; the



1 KERIVOULA ÆROSA Tmp. – KERIVOULA LANOSA Smith

W West lith

descriptions of the species themselves being often quite sufficient, supposing that they had been more carefully divided into groups.

Two principal works which demand study in working out the species of *Vespertilionidæ*—Temminck's Monograph, and Wagner's Supplement to the work of Schreiber—are of this description. Whilst giving a pretty complete account of each species, the generic definition is, in consequence of the great disparity in the characters of the different species, necessarily so vague as to be nearly useless.

Scarcely more valuable to the investigator are lists of genera and species without accompanying descriptions, or having these so excessively brief as to be wholly unavailable in distinguishing species.

I have therefore, while bringing together species which fall easily under a generic definition, considered it advisable to add also a description of each, although they may have been before described, or be even well-known species.

By adopting this method I am enabled to give much more complete descriptions than have hitherto appeared, because they are of a more comparative nature, and are therefore more serviceable in the discrimination of allied species.

With regard to the synonymy of the several groups, it is as complete as I have been able to make it, but is I believe very imperfect. In all instances care has been taken to exclude such names and references as I could not either personally test by the examination of unquestionable species, or by the comparison of figures and descriptions agreeing with such accuracy as to leave no reasonable doubt as to their identity.

This explanation appeared necessary previous to bringing before the Society successive papers in which but very few of the species are new, and many old and well-known ones are described at some length.

The name of *Kerivoula* was first given by Boddaert * to a species of Bat which had before been described by Pallas † by the name of *Vespertilio pictus*—a name singularly appropriate for an animal with the bright red fur and membranes, and the peculiar distribution of the colour on the latter, which characterizes the species.

Boddaert's specific name having given way to that of Pallas, has been taken up by Dr. Gray ‡, and used in a generic sense, he having perceived that the species differed considerably from most other representatives of the genus *Vespertilio*. But Dr. Gray, placing great reliance on the importance of a single character, has arranged with it some species, the affinity of which the subsequent examination of a greater number of species has not corroborated. In these investigations others have been discovered which bear very close generic resemblance to the original one, *V. pictus*, whilst some of those which have been associated with it prove, on the contrary, to be by no means closely affined.

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* Elenchus Animalium, vol. i. sist. Quadrup. p. 70, No. 10, 1785.

† Spicilegia Zoologica, iii. p. 7, 1774.

‡ Annals and Mag. Nat. Hist. 1842, p. 258.

I have in a previous communication to the Society removed one of these species—*V. formosus*—from the present genus, and placed it in the group with the members of which its characters most closely agree. After describing the species which I consider referable to the genus *Kerivoula*, I shall enumerate such others as have been called by that name, but which I consider as appertaining to other groups.

Fam. VESPERTILIONIDÆ.

Genus KERIVOULA, Gray.

Vespertilio, Pallas, Geoffroy, Desmarest, Fischer, Schreiber, Wagner, Temminck.

The top of the head is very much elevated, but not so much so as in *Furipterus, Natalus*, and *Miniopteris*. The face is depressed; and the muzzle is of moderate length, and somewhat pointed. The nostrils, which are near together, open sublaterally, and have an emarginate space between them. The lower lip has a tolerably well defined naked triangular space in front. The ears are broad, with the outer margin so much developed near the base as to form a complete *lobulus*, which however is not separated from the upright part of the ear by a notch or hollow, as in some species. The ear may, indeed, be described as extending along the side of the face for some distance, and in a line with the corner of the mouth, not as a narrow strip of membrane, as in the generality of species, but ascending at once from its most anterior point, and forming what is called the ear-conch. Its inner margin is very convex, and curves off to the tip of the ear, which terminates in an angular point not very acute. In all the species there is a notch or hollow of more or less extent in the outer margin, *very near to the tip*.

The ear bears great resemblance to those of *Furipterus* and *Natalus*, especially to those of the latter. The tragus is long, nearly three-fourths the length of the ear, *excessively narrow and pointed*, and a little curved outwards. Its outer margin near the base is furnished with a projecting point or tooth.

The tail is rather long, in some species as long as the head and body. The wing-membranes extend to the base of the toes. The feet are of medium size; and the toes occupy a little more than half the length of the foot. The thumb also is moderate; and the basal phalange, which is enclosed in the membrane, is shorter than the remaining part.

The membranes and ears of all the species are more or less diaphanous, and rather conspicuously marked with glandular dots arranged, on the former, in lines.

The fur is of a fine woolly texture, in the Asiatic species without lustre; but in the African ones the hairs have shining tips.

The skull does not, as might have been expected, exhibit any of those peculiarities which are observable in the high-crowned genera, such as *Furipterus, Natalus*, and *Miniopteris*. In its general appearance it somewhat resembles those of *Vesp. mystacinus* and

Vesp. Nattereri, but the central region is much more inflated—indeed in the African species almost as much so as in *Furipterus*. Besides this point of difference, the following peculiarities require mention. The facial region is very much depressed, and also compressed; and the notch in the fore part of the palate is much deeper than in any other genus, but varies considerably in the different species. This appears to be due chiefly to the straightness of the intermaxillary bones, their development in a forward direction affording space for the incisors to range in a line with the other teeth, instead of being placed more or less across the opening between the two canines. This is best seen in the *K. picta*.

The bony palate extends nearly as far back as to the condyloid fossa, and narrows considerably after leaving the posterior boundary of the molar range. In no other Bat which I have examined has the palate extended further back than to the middle of the zygomatic arch.

Dentition.—In. $\frac{2-2}{6}$; Can. $\frac{1-1}{1-1}$; Premol. $\frac{3-3}{3-3}$; Mol. $\frac{3-3}{3-3}=\frac{18}{20}$.

The upper incisors are slender, conical, and pointed, with a slight accessory cusp behind the base; the anterior ones are the longer. The canines are long and pointed; and in most of the species the *cingulum* is amply developed. Between them and the incisors the interval is very small. The next two teeth are very simple in form, conical, and pointed. Following these is the *carnassier* or sectorial tooth, in form as in the ordinary *Vespertilionidæ*; and the molars are of the ordinary form and proportions.

In the lower jaw the incisors are small and trilobed, those contiguous to the canines having their central lobe *very much developed, and of a blunt conical form*. The canines require no particular notice. Following these, the premolars present the appearance of three very regular and pointed cones, each with a small but distinct spur on its anterior and posterior surface near to the base. The molars are of the form so constant in the *Vespertilionidæ*.

1. Kerivoula picta.

Vespertilio pictus, Pallas, Spicil. Zool. iii. p. 7, 1774; Erxl. Syst. p. 150, 1777; Linn. Syst. Nat. ed. Gmel. i. p. 49, 1788; Geoff. Ann. du Mus. viii. p. 199, pl. 48 (cranium), 1806; Desm. Mam. p. 141, 1820; Schreib. Säugth. Th. i. p. 170, 1826; Horsf. Zool. Research. Java, viii. p. 6, 1821–28; Fisch. Synop. Mam. p. 106, 1829; Temm. Mon. ii. p. 223, pl. 56. f. 1, 2, 3, 1835–41; Blasius, Wiegm. Archiv, Bd. vi. p. 2, 1840; Wagn. Supp. Schreib. i. p. 517, 1840: Schinz, Synops. Mam. p. 174, 1844; Kelaart, Faun. Zeylan. p. 25, 1852.

Vespertilio (*Kerivoula*) *pictus*, Horsf. Cat. Mam. Mus. E. Ind. Comp. p. 40, 1851.

Pipistrellus pictus, Less. Nouv. Tab. Règne Anim. p. 29, 1842.

Kerivoula picta, Gray, Ann. and Mag. N. H. p. 258, 1842; Cat. Mam. B. M. p. 27, 1843; Kelaart, Faun. Zeylan. p. 25, 1852.

Although I have given to this species the most prominent position, I do not regard it as the most typical of the genus; but the generic name having been borrowed from it, it appeared desirable to mention it first, and those afterwards which are less known, but perhaps more characteristic.

The top of the head is very much elevated, but not quite so much so as in some of the other species of *Kerivoula*; and the muzzle is a good deal depressed, and of medium length.

All the face is very hairy, the fur of the forehead extending nearly to the end of the nose, and filling up the concavity of the face. The upper lips are furnished with fine longish hairs of the same texture as those of the rest of the body.

The ears, as already mentioned in the generic description, are broad, and when seen in front appear like two rather broad recesses, in the further end or bottom of which the tragus takes its origin. They are rather more pointed than in some others, owing to a shallow notch immediately below their tip, in the outer margin; and the inner margin becoming more convex as it approaches the tip, assists in giving to the latter an outward direction.

The tragus has been already described sufficiently.

The wing-membranes extend precisely to the base of the toes.

The tail is as long as the head and body, is composed of six joints, and has its tip enclosed in the membrane.

The fur of the back extends sparingly on to the interfemoral membrane, for half its length; and all its transverse lines are studded with very short and fine hairs, scarcely visible without the assistance of a lens. The upper surface of the tail itself, and of the legs and feet, are sparingly, but visibly, clothed with fine hairs, most conspicuously on the latter. The whole of the margin of the interfemoral membrane, inclusive of the *os calcis*, is fringed with fine hairs, those on the *os calcis* being adpressed and similar to those of the feet, whilst those on the edge of the membrane are projecting and bristle-like.

On no other part of the membranes does the fur of the body encroach; but that of the head extends for half the length of the ears, on their hinder surface.

The fur of the body is very fine, but without gloss, and nearly unicoloured. That of the upper parts is buff for two-thirds of its length, the remainder a bright and lively rust-colour. Beneath, it is uniform whitish buff, tinged with rust-colour on the humeral region and along the sides of the body.

All the bones of the limbs in the dried specimens are of a light yellowish-brown; and the interfemoral and interbrachial membranes are of the same colour. A part of the wing-membranes contiguous to the sides of the body, from the foot to the elbow, and from thence along the under side of the fore-arm to the wrist, is of a similar colour; and it passes from the wrist along each finger, margining it on each side, and leaving three triangular interspaces between the digits, of a deep chocolate-brown colour, which in many places is elaborately marked with dotted lines of the same light colour as that which accompanies the wing-bones.

The above description having been taken from dried specimens, I copy the following description of the colour of this species from the excellent account given of it by Dr. Kelaart in his 'Fauna Zeylanica.'

"Body above, yellowish ferruginous-brown, or, as artists would call it, yellowish crimson-brown. Below, fulvous whitish, with a dark yellowish tinge on the sides. Alar membranes black and bright yellow or citron-coloured. The former colour (black) confined to triangular spaces between the citron rays along the digits, and on a large triangular space between the last digit and body; the alar membrane adjoining the latter being also citron-coloured. Interfemoral membrane wholly citron-coloured ; above and below the arms also, the same yellow colour prevails, as through the other parts of the membrane already mentioned." "Tips of toes brown, the rest yellow." "Ears yellow." "Sexes alike in colour."

As Dr. Kelaart is speaking of the species in its native country, and from personal observation when in a fresh state, the foregoing account is doubtless the correct one, and the comparatively dull colour which pervades all the specimens in our Museums is due to a change having taken place after preservation.

The following dimensions are taken, (1) from a Javanese specimen very kindly given to me by Dr. Horsfield, (2) from a specimen from Amboyna, and (3) from the specimen mentioned in Mr. Waterhouse's Catalogue of the Mammalia contained in the Museum of the Zoological Society, No. 138.

	1.		2.		3.	
	″	‴	″	‴	″	‴
Length of the head and body, about ..	1	9	1	9	1	10
——— of the tail	1	6	1	6	1	9
——— of the head	0	7	0	7½	0	7½
——— of the ears	0	6	0	5	0	5
Breadth of the ears	0	5	0	5	0	5
Length of the tragus	0	3½	0	3	0	3
——— of the forearm..............	1	4	1	3½	1	4
——— of the longest finger	2	11	2	10	3	0
——— of the fourth finger	2	0	1	11½	2	1
——— of the thumb	0	3	0	3	0	3
——— of the tibia	0	7	0	7	0	7½
——— of the foot and claws	0	4	0	3½	0	3½
——— of the *os calcis*	0	6½	0	6	0	6½
Expanse of wings..................	10	6	10	0	11	0

Hab. The Continent of India ; Ceylon ; Java ; Sumatra ; Borneo.

2. KERIVOULA PAPILLOSA.

Vespertilio papillosus, Temm. Mon. de Mam. ii. p. 220, 1835–41 ; Wagn. Supp. Schreib. Säugth. i. p. 515, 1840; Schinz, Synops. Mam. i. p. 173, 1844 ; Blasius, Wiegm. Archiv, Bd. vi. p. 2, 1840 ; Gray, Zool. Voy. Samar. no. 5. p. 10, 1849.

The present species, although not placed first on the list, is, I believe, quite as typical of the genus as the one preceding it. The top of the head is quite as much elevated as in that species; and the face is similarly depressed, and densely hairy; the nostrils, too, present precisely the same form and position. The ears are somewhat longer in relation to their breadth and to the size of the animal, than in *K. picta*, and have their points less acute and directed upwards, instead of outwards as they are in that species. They are thickly and conspicuously dotted with glandular dots. The tragus is fully two-thirds of the length of the ear, is narrow, and tapers evenly to a very acute point. It has a very slight outward curvature for its whole length, and has a projecting point on its outer edge, close to its base.

The body of the animal is small, and all the membranes very much developed, nearly as much so as in *Natalus*.

The thumb is rather long, and the basal phalange less than half its entire length; the feet are rather large, with the toes taking up half of their length, and the outer one a little shorter than the others, as it is also in *K. picta* and *K. Hardwickii*. The wing-membranes extend exactly to the base of the toes; and the *os calcis* is two-thirds of the length from the foot to the end of the tail.

The hair of the face presents some differences from that of the last species. In *K. picta* that which borders and fringes the lips is of the same peculiar soft and woolly texture as the rest of the fur of the head and face; that of *K. papillosa*, on the contrary, is strong and bristle-like. Over the eyes is a tuft which is nearly four lines in length, and is very straight; and above the nostrils is a similar fringe of straight strong hairs, whilst the upper lips are margined similarly with hairs which have a downward curvature and almost conceal the mouth when it is closed.

The upper surfaces of the ears are hairy only near the base; and the fur of the upper parts of the body does not encroach noticeably on to the wing-membranes; but the base of the interfemoral membrane is a little hairy, and fine short hairs are scattered along the upper surfaces of the tail, tibia, and feet. The free portion of the edge of the interfemoral membrane, between the *os calcis* and end of the tail, is also slightly fringed with fine short hairs.

The fur is fine and woolly in texture, and very long, that of an example in the Museum of the East India Company, from Calcutta, attaining as great a length as four lines on the dorsal region. It is bicoloured both above and beneath. On the whole of the upper parts it is dusky at the base for nearly two-thirds of its length, with the terminal third brown (nearly of the same tint as the back fur of *Vesp. Daubentonii*, but a little more tinged with rufous). Beneath, it is dusky at its base, tipped with yellowish-brown. Such is the colour of the specimen alluded to, presented to the Company's Museum by Mr. Pearson. A specimen in my own collection, taken in Ceylon by Mr. Thwaites, appears to exhibit the usual differences which exist between the animals of that island and the mainland of

India. It is smaller and darker in colour, but is otherwise similar to the Calcutta specimen. The membranes are of a medium brown colour, darker in the Ceylon specimen.

Dentition.—In. $\frac{2-3}{6}$; Can. $\frac{1-1}{1-1}$; Premol. $\frac{3-3}{3-3}$; Mol. $\frac{3-3}{3-3}=\frac{18}{20}$.

I can detect no difference in the position or proportions of the teeth in this species from those of *K. picta*.

No. 1 of the following table refers to the specimen from Calcutta, and No. 2 to the one from Ceylon.

	1.		2.	
	"	'''	"	'''
Length of the head and body	....		1	9
——— of the tail	2	0	1	9
——— of the head	....		0	7½
——— of the ears	....		0	4½
——— of the tragus	....		0	3½
——— of the forearm	1	6¼	1	4
——— of the longest finger	2	5	1	10
——— of the fourth finger	2	3	1	11
——— of the thumb................	...		0	3½
——— of the tibia	0	9½	0	8
——— of the foot and claws	0	4	0	4
——— of the *os calcis*	....		0	6
Expanse of wings	....		10	0

Hab. India; Ceylon; Java, and Sumatra.

3. KERIVOULA HARDWICKII.

Vespertilio Hardwickii, Horsf. Zool. Research. Java, no. 8, 1821–28; Cat. Mamm. E. Ind. Comp. Mus. p. 39, 1851; Temm. Mon. ii. p. 222, 1835–41; Wagn. Supp. Schreib. Säugth. i. p. 516, 1840; Blasius, Wiegm. Archiv, Bd. vi. p. 2, 1840; Schinz, Synops. Mamm. i. p. 173, 1844.

Kerivoula Hardwickii, Gray, Ann. Mag. N. H. x. p. 258, 1842; Cat. Mamm. B. M. p. 27, 1843; Zool. Voy. Samar. no. 5. p. 7, 1849.

Vespertilio pellucidus, Waterh. Proc. Zool. Soc. pt. xiii. p. 3 et 6, 1845.

Vespertilio? pellucidus, Gray, Zool. Voy. Samar. no. 5. p. 7, 1849.

The following description has been taken from the original specimens in the Museum of the East India Company and in the British Museum, and from the one which furnished the description of *V. pellucidus* of Mr. Waterhouse, now also in the National Collection.

The examination and comparison of these has proved beyond question the identity of the latter species with *K. Hardwickii.* As the Javanese specimens are preserved in skin, and the one from the Philippines in spirit, they may be supposed, taken together, to furnish a tolerably accurate description of the species.

The elevated form of the head, the concavity of the face, and the shape of the muzzle and nostrils are so much like the same parts in

K. picta and *K. papillosa,* as to require no further mention. The ears, although in general form very similar to those of the former of these species, differ in being a little longer, and in having their tips less acute and not so much directed outwards; in fact, they very closely resemble those of *K. papillosa,* and, as in that species, are thickly studded with glandular dots. The tragus is nearly two-thirds of the length of the ear, is narrow, excessively acute, and curved outwards in the dried specimens, but perfectly straight in the one in spirit.

The wing-membranes extend a little further than the base of the toes, almost to the middle of the outer one, which however is shorter than the others, and consequently the membrane does not reach as far as to the middle of the other toes, which may be said to constitute the foot. These remaining toes are of equal length, and are about half the entire length of the foot, which is rather large in relation to the size of the animal. The *os calcis* is long, and occupies two-thirds of the distance between the foot and end of the tail. The interfemoral membrane has about 18 or 19 transverse dotted lines.

The fur of the upper part of the body extends on to the wing-membranes for a little distance, and on to the interfemoral membrane in a similar manner. Beneath, the fur encroaches on the membrane similarly, but in a less degree. The upper surfaces of the tibiæ are fringed with fine bristly hairs; and the dots on the interfemoral membrane have each a bunch of very fine short bristles on the upper surfaces, and the glandular dots of the ears are similarly provided on their hinder surfaces. Also the free portion of the interfemoral membrane, between the *os calcis* and tail, is fringed with fine short hairs.

The fur is long, very fine and woolly; that of the upper parts of the body is grey at the base, which is succeeded by pale brown, and tipped with a slightly darker tint of the same colour. These shades are not sufficiently distinct to give a tricoloured appearance to the fur, the general appearance of which is buffy-brown. This is the colour of the type-specimen, which has probably faded considerably. That of the specimen in spirit appears (as far as can be seen of the colours in spirit) to be of a reddish cinnamon-brown colour.

The membranes and ears are of a pale reddish-brown colour, and translucent. "I could," says Mr. Waterhouse, "read this writing through the wing-membranes, moistened as they were with the spirit, at a distance of more than a quarter of an inch."

The dentition, according to Mr. Waterhouse, is—In. $\frac{2-2}{6}$; Can. $\frac{1-1}{1-1}$. The molars have not been examined.

The two inner upper incisors are, as in *K. picta* and *K. papillosa,* in advance of the others, long, curved, and pointed; whilst the outer two are placed considerably behind them, and are smaller.

Those of the lower jaw are trilobed and small.

The following dimensions have been taken (1) from the original specimen of *V. Hardwickii,* and (2) from the type specimen of *V.*

pellucidus. Those of the second column will appear at first sight to differ a good deal from those of the first, but probably the latter may be considerably altered from its real size by the state of preservation. Such parts as could not be altered by this means, as the bones of the wings, do not differ materially, as may at once be seen by reference to the table.

	1.		2.	
	″	‴	″	‴
Length of the head and body	1	3	1	9
——— of the tail	1	4	1	11
——— of the head	0	6	0	8
——— of the ears	....		0	7
Breadth of the ears	....		0	6
Length of the tragus	....		0	4
——— of the forearm	1	2¾	1	3
——— of the longest finger	2	8	2	10½
——— of the fourth finger	1	9	2	1
——— of the thumb	0	3	0	3¼
——— of the tibia	0	7	0	7
——— of the foot and claws	0	4	0	4
——— of the *os calcis*	0	5½		
Expanse of wings	9	6	10	6

Hab. Java; Philippine Islands.

4. Kerivoula lanosa.

Vespertilio lanosus, Smith, Ill. Zool. S. Africa, pl. 50.

This species presents precisely the same generic peculiarities which characterize the foregoing; and they are quite as typically developed. It possesses the same elevated crown and small muzzle, and has ears and tragi of a similar shape, the differences being such only as are purely specific; but these differences, taken in the [illegible] sense, are very conspicuous. Whilst the fur is relatively as long as that noticed of *K. papillosa,* it is, in addition to that, very thick and curly, with the tips very glossy.

But it is necessary first to notice some other slight differences which exist in the form of the ears and the distribution of the fur. The ears, although of the same general form as those of *K. picta* and the other species here treated of, yet differ in being more deeply notched externally towards the tip.

The tragus is of the same tapering and pointed form observable in the other species.

The face is very hairy, in some examples excessively so, the fur of the forehead almost concealing the ears; and it is of the same soft quality as that on the top of the head and on the back, a small quantity only in front of the eye assuming a more bristly appearance. The ears have their hinder surfaces clothed with hairs, and when seen from behind are scarcely visible. The fur of the back does not encroach on the membranes of the wings, but extends on to the base of the interfemoral membrane for nearly half its length, and, thinning out, leaves the hinder half naked. The upper surfaces of the tail, feet, tibiæ, forearms, and thumbs and index-fingers are garnished with short and shining hairs of a silvery or pale golden-yellow colour.

The hinder margin of the interfemoral membrane, between the *os calcis* and tail, is furnished with a very remarkable comb-like fringe of prominent thick-set hairs, which, curving downwards, have their points directed towards the belly of the animal. On all the upper parts the fur is tricoloured, with a faint indication of a fourth colour. At the root it is blackish-grey for nearly half its length, which is succeeded by palish-brown, and this again for a very short length of a darker tint, and finally tipped with sulphur-yellow. The latter colour is on the head, neck, and shoulders so pale as to give a silvery appearance to the tips of the hairs, which is heightened by their being curly, somewhat as in the fur of the common hare. Towards the hinder parts they are less curly, and more yellow in colour, especially those which grow on the legs, tail, and interfemoral membrane. The same may be said of those on the upper surface of the forearms, thumbs, and index-fingers.

Beneath, the fur is bicoloured, dark at the base, with the terminal fourth whitish-grey, very much as in the common *Vespertilio mystacinus*; but the light-coloured tips are more shining than in that species.

The membranes are of a medium brown colour, somewhat diaphanous, and have their veins thickly marked with glandular-looking dots.

The description of the cranium will be given in connexion with that of the skull of the next species, the better to illustrate by immediate comparison the difference between the two.

In the following table of dimensions, the first column are those of a male and the second those of a female, both from the same locality:—

	1.		2.	
	"	‴	"	‴
Length of the head and body, about..	1	9	2	0
——— of the tail	1	7	1	6
——— of the head	0	7	0	7
——— of the ears.................	0	4½	0	5
Breadth of the ears	0	5	0	5
Length of the tragus..............	0	3½	0	3½
——— of the forearm	1	2½	1	2¾
——— of the longest finger	2	9	2	9
——— of the fourth finger	1	11	1	10½
——— of the thumb...............	0	3	0	3
——— of the tibia	0	6	0	6
——— of the foot and claws	0	3½	0	3½
——— of the *os calcis*	0	9	0	8
Expanse of wings	10	0	10	3

Hab. South Africa, the eastern coast.

5. KERIVOULA ÆROSA, n. s.

This species, from the same locality as the last, resembles it in the long and curly nature of the fur, but is larger and differently coloured. The ears, too, are larger, with the ends more rounded, and less deeply notched externally.

The top of the head, although much elevated, is scarcely so much so, relatively, as in *K. lanosa*, and the muzzle is proportionally longer, but the nostrils and snout are shaped as in that species. The ears have their ends rounded, quite as much so as in the *Notch-eared Bat* and *Natterer's Bat* of Europe; and the hollow in the outer margin near to the end scarcely deserves the name of notch. It is in fact a mere indentation, shallow, but regular, and occupying nearly one-third of the outer margin. In all other respects the ears resemble those of the foregoing species, and indeed those of the other representatives of the genus. The tragus offers no deviation in form from that of the species already described; it is long, tapering, and pointed.

The membranes are similar to those of *K. lanosa*, excepting that they are not quite so distinctly marked with dotted lines as in that species.

The fur of the head is only of medium length, and does not obscure the ears, nor extend so far along the face as in *K. lanosa*. The face is in fact moderately hairy, with a woolly moustache on the upper lip, and a naked space between the eye and ear. The chin also is nearly naked.

On no part of the membrane does the fur of the back extend, and that of the under parts only to a very trifling extent on the base of the interfemoral membrane; but the upper surfaces of the legs, feet, and heel-cartilages, of the tail, forearms, thumbs, and index-fingers, and of the two terminal phalanges of the longest fingers, beyond the extremity of the index fingers, are more or less clothed with short adpressed shining hairs, thickest on the forearms and tail, but nowhere so thick as in the last species. The edge of the interfemoral membrane, between the heel-cartilage and tail, is sparingly furnished with short bristly hairs, very unlike the thick comb-like fringe of *K. lanosa*.

The fur of all the upper parts is long, thick, and curly, and nearly uniform in colour over the whole of the back, varying only in becoming a little darker towards the rump. It is of four colours,—dark grey-brown at the base for nearly half its length, succeeded by yellowish-brown, then by deep umber-brown, and tipped with shining bronzy yellow; that which is spread over the upper surface of the limbs, tail, &c. wholly of the latter colour.

Beneath, the fur is of a dark sepia-brown colour, tipped with brownish-bronze colour.

In no other Bat have I seen fur at all resembling that of the present species. It is not difficult to attain a tolerably correct idea of its general appearance, by supposing a small species with fur of the quality and texture of that of the common hare, but of a dark brown colour, and with the light tips observable in the fur of that animal, changed to a shining golden-bronze colour.

	1.		2.	
	″	‴	″	‴
Length of the head and body, about..	1	9	2	0
——— of the tail	1	6	1	8
——— of the head	0	8	0	8
——— of the ears	0	5½	0	5½
Breadth of the ears	0	5½	0	6
Length of the tragus	0	4	0	4
——— of the forearm	1	5	1	5
——— of the longest finger	2	9	2	10
——— of the fourth finger	2	1	2	1
——— of the thumb	0	3½	0	4
——— of the tibia	0	6½	0	6½
——— of the foot and claws	0	4	0	4
——— of the *os calcis*	0	7	0	7
Expanse of wings	10	6	10	6

Hab. South Africa, eastern coast, the same locality as the preceding species.

On comparing the skulls of three of the foregoing species, *K. picta*, *K. lanosa*, and *K. ærosa*, I find their general form to be pretty similar, but yet presenting some slight modifications which require notice. Of these, *K. lanosa* has the cranium proportionally the shortest, and with the cerebral region most elevated, closely approaching *Furipterus* in this respect. It also has the facial portion more depressed, and the notch between the intermaxillary bones less deep than in *K. picta*; and these bones are not so much separated at their anterior extremities as in that species, so that the incisors which they bear are less separated also, and have an inward deviation from the line of the other teeth, contrary to what has been stated in the generic description. However, in this species, the upper incisors by no means approximate each other closely as they do in *Furipterus*. In other respects the crania of *K. picta* and *K. lanosa* do not differ materially; and the dentition is also so similar as to present scarcely any differences worthy of notice. The outer incisor in the lower jaw has precisely the same central elevated cusp already noticed, and is similar in both species; but the skull of the third species, *K. ærosa*, has, on the contrary, the top of the skull less elevated than in *K. picta*, and the facial depression scarcely so deep, owing chiefly to the hinder extremities of the nasal bones having a somewhat inflated form. The facial portion of the skull is rather long in proportion to its entire length; and the bones of which it is composed are much thicker than in the other species, giving support to much longer and stronger teeth. Indeed the whole skull and teeth are much more substantial than the other and more typical species of the genus.

The lower jaw, with its teeth, is of proportionate strength, and is rather thick at the *symphysis menti*, where it has a slight descending process.

In number the teeth resemble those of the other species, but differ somewhat in their form. The outer lower incisors, although they have the central principal cusp already mentioned, yet have it so little developed that it would scarcely be regarded as singular if previous notice had not been called to it*. The upper incisors present a remarkable deviation from what appears typical: instead of two pairs of well-developed teeth, we find instead that the inner ones are long and pointed, but the outer ones merely rudimentary, so that they can scarcely be seen without the aid of a lens. The upper canines are long, strong, and angular; and the premolar next to them is also long and pointed. These differences in the teeth are alone sufficient to distinguish this species.

The following are the dimensions of the crania of these three species:—

	K. picta.		*K. lanosa.*		*K. ærosa.*	
	"	'''	"	'''	"	'''
Entire length of the skull exclusive of the incisors	0	7	0	6		
Greatest breadth across the zygomatic arches	0	4	0	3¾	0	4¼
Breadth of the skull behind the zygomatic arches	0	3½	0	3¼	0	3¾
Length from the posterior root of the zygoma to the anterior point of the intermaxillary bones	0	4¾	0	4	0	5
Length of the zygomatic arches	0	2	0	2	0	2½
Length of the bony palate	0	3	0	2¾		
Length of the dental series in the upper jaw	0	3¼	0	2¾	0	3
Breadth between the outer cusps of the two posterior molars	0	2¾	0	2½	0	2¾
Breadth between the tips of the upper canines	0	1½	0	1¼	0	1½
Length of the lower jaw, exclusive of the incisors	0	5	0	4¾	0	5¼
Elevation of the condyle above the lower edge of the ramus	0	1¾	0	1½	0	1½
Length of the dental series in the lower jaw	0	3½	0	3¼	0	3¾

The following species, having the wing-membranes attached as far along the foot as to the root of the toes, have been placed by Dr. Gray in this genus; but their similarity to the species of other genera, or minor groups, has induced me to leave them out of the present monograph. *Kerivoula formosa* I have already separated from it, and placed in company with the *Vespertilio emarginatus* of Europe, and some other species. *K. Sykesii* is a small species, closely allied, if not identical, with *Scotophilus coromandelicus* ; and *K. poensis* and *K. grisea* are both referable to the same subgeneric division of the genus *Scotophilus,* all having characters pretty similar to those of the *S. pipistrellus, S. Kuhlii,* and *S. marginatus*. *K. trilatoides* is a true *Vespertilio,* having the same generic forms as *Vesp. mystacinus*. *K. brasiliensis* I have not seen.

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* It is curious and interesting to note the very slight outward deviation from the more typical forms, exhibited by this species, and to find on examination that it possesses also an internal departure from the same typical standard; and it is satisfactory to find that these differences are such as accord well with each other, externally and internally. The slightly more bulky appearance of the animal, accompanied by membranes of less delicate nature, and more imperfectly marked with the veins and papillæ which are so characteristic of this and the allied genera, is associated with an osseous system of greater solidity, and with upper incisors which approach in their inequality of size those of many of the species of the robust genus *Scotophilus*. If we examine, for instance, the upper incisors of the *Noctule* or the *Hairy-armed Bat*, we shall perceive at once that the inner ones are much the largest, just as they are in *K. ærosa*; and in those stout species of the genus *Vespertilio* which have a near affinity with *Scotophilus*, the same thing is observable.

I have taken the occasion in a former monograph to give a few notes on the classification of some of the species of *Vespertilionidæ* ; and I seize the present opportunity of adding such others as bear on the same point, which have arisen during the examination of the species comprised in the present memoir.

The observations I made were something to this purpose,—that after eliminating such easily recognizable genera as *Plecotus* and *Barbastellus* from the genus *Vespertilio,* as given by M. Temminck, there yet remained a large number of species differing greatly from each other, but the most diverse of which were so connected by intermediate species as to be with great difficulty brought under generic definition. The common *Noctule Bat* and the *Whiskered Bat* were given as familiar examples of the desired genera, the first being considered as typical of the stout species which are organized for strong and rapid flight in exposed situations, and for capturing and masticating the larger species of Coleoptera ; and the latter was given as an example of the light and comparatively fragile species which take their minute food amongst the foliage, or in other confined situations. But the *Whiskered Bat* is by no means the most typical of the slender species. The genera *Furipterus, Natalus,* and *Hyonycteris* are the most so, and *Kerivoula* immediately after them, and before *Vespertilio,* in which genus, in its restricted form, the *Whiskered Bat,* with many other species, takes its place.

Assuming that *Kerivoula* is a more typical genus than *Vespertilio,* we should expect its habits to be in accordance with its structure, and to differ somewhat from those of *Vespertilio* ; and the following (all that I can gather which appears authentic) will throw some light on this point. In vol. xiv. of the 'Annals and Magazine of Natural History' the following notice of one of the species, *K. picta,* appears, from the pen of Capt. R. C. Tytler : "This elegant Bat is found in thick jungle, and is only observed when disturbed by suddenly flying out of its retreat and taking almost immediate shelter, like a moth, amongst the bushes." Dr. Kelaart, after observing that there are no Bats in Ceylon called "*Kerivoulha,*" says "*Kehilvoula* is the Cingalese name for the yellow Bats found on plantain trees,—'*Kehil*' in Cingalese meaning plantain, and '*Voulha*' a bat. We have never obtained the *Kerivoulha* from any other places than plantain groves, where they are generally found clinging to the fruit."

From the observations of these gentlemen it would appear that the *Kerivoula picta* is an arboreal species, certainly resting during the day among dense foliage, and more than probably taking its food in similar situations. It would be interesting to know if those which Dr. Kelaart has seen clinging to the plantain fruit had chosen that as a resting place, or were in search of insects which might feed on the fruit; for we cannot suppose that the Bats would be feeding on the latter: they are too purely insectivorous in their structure.

Of another species inhabiting South Africa, *K. lanosa*, Dr. A. Smith says that it frequents "a wooded district stretching along the sea-shore about 200 miles from Cape Town. Like other species of the genus, it appears as night sets in, and may then be seen flitting from spot to spot along the open spaces which exist here and there in different parts of the forest."

These short extracts comprise all that I can learn of the habits of the genus under consideration; but such as they are, they tend to corroborate my previous supposition, derived from observing the obvious similarity of the organs of flight to those of some of the *Rhinolophi*, one species of which I have observed in a state of nature.

When we look at the considerable development of the cutaneous system, and its delicate nature, and the ample organs of flight with their slender digits, in the genus *Kerivoula*, we can readily perceive that they are not well-suited for exposed flight, but that they would be admirably adapted for flitting amongst the boughs and leaves of trees; and the existence of numerous lines and papillæ, probably nerves of sensation, in the membranes, would render them highly delicate organs of touch, and a safe protection against the injuries which their slender members might otherwise sustain in such places. All the membranes of this and the allied genera *Furipterus*, *Natalus*, and *Hyonycteris* are elaborately veined and dotted, just as in the *Horse-shoe Bat*; and I have had a good opportunity of witnessing the extraordinary powers of flight of the latter.

On one occasion I had liberated from a box in my usual sitting-room a *Pipistrelle* and a *Lesser Horse-shoe Bat*. The former flew directly against the glass of the window, just as a bird does, and repeated the attempt to escape several times. The *Horse-shoe Bat*, instead of doing this, although it approached very near to the glass, never even so much as touched it with the tips of its wings; and I could distinctly see it pass in front of each pane so near as almost to touch it, but at the same time avoid the prominent wood-work of the window. Under and amongst the tables and chairs it passed with perfect ease, touching nothing, and behind the window curtains in a similar manner, although there was scarcely an inch of space between them and the wall. At length, when flitting in front of some book-shelves from which I had just removed an octavo volume (Temminck's Birds of Europe), it seemed, if I may use the expression, to *feel* the vacant space, and passed in and out again without, I believe, even so much as touching the volumes on either side.

Mr. Blyth has observed of *Natterer's Bat* that it occasionally "flapped against a glass case" while flying round a room. I have often seen various species of *Vespertilionidæ* do the like against the walls and furniture of a room, but have never seen the *Horse-shoe Bat* do so.

Now, although speculation in zoological science is scarcely admissible, yet I am tempted to suggest, from the general similarity of the organs of flight in the genera *Furipterus, Natalus, Hyonycteris,* and *Kerivoula* with those of *Rhinolophus,* that they may have precisely the same function to perform; and I should entertain but little doubt of this, were not the latter provided with very singular cutaneous expansions, as nose-leaves and facial crests. These have by some observers been considered as organs of touch, performing in fact the office of eyes. But this latter suggestion is at best a mere suggestion, since we find amongst the *Rhinolophidæ* some species which, while they possess all the other peculiarities of *Rhinolophus,* are destitute of what may properly be called a nose-leaf, having in its stead grooves and hollows not likely to be highly sensitive organs of touch. This is the case with *Rh. aurantius* of Australia, and with *Nycteris,* which is simply a modified *Rhinolophus.*

Without further pursuing these suggestions, I may state my belief that it is in the *whole expansion of the cutaneous system* that the singular sense with which these animals are endowed exists, and that this, if properly investigated, will afford one of the most certain indices to the natural classification of the *Vespertilionidæ.*

Before concluding, I wish to add a suggestion relative to the probable habits of *Hyonycteris,* derived from the examination of specimens. As the creature is destitute of claws to the feet, which could be used as instruments of support, and has suctorial disks instead, it appears probable that it would be capable of traversing such surfaces only as were sufficiently even for the action of the disks, and that suitable surfaces might be furnished by the fruit or leaves of many of the trees of tropical America, from which the pig-like snout of the animal would be well adapted for taking minute insects, in a state of rest.